CASE REPORT

Varus instability of the hallux interphalangeal joint in a taekwondo athlete

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The hallux interphalangeal joint is stable in the transverse plane and there have been only a few reports of varus instability of this joint. A case is described of varus subluxation of the hallux interphalangeal joint in a taekwondo athlete and the surgical outcome after reconstruction of the collateral ligament. Taekwondo athletes, who require fast powerful kicks, should be warned about this type of forefoot injury.

Injuries of the forefoot are common in sports activities involving running, jumping or contact, and these occur most commonly around the metatarsophalangeal joint as rupture of the collateral ligament, turf toe, sesamoid pathology and metatarsal stress fracture.[1–3] The hallux interphalangeal joint is a simple hinge joint which allows motion in the sagittal plane, so this joint has been regarded as inherently stable and has received little attention in athletic injuries compared with the metatarsophalangeal joint.[4] We have found no report of transverse plane instability of this joint in the English literature and report a rare case of varus subluxation of the hallux interphalangeal joint in a female taekwondo athlete.

CASE REPORT

A 19-year-old female taekwondo athlete presented with pain and instability of the hallux interphalangeal joint in her left foot. The symptom occurred after spraining the big toe several times when she rapidly raised the foot for a kick and the big toe was caught in the side of the mat. The hallux interphalangeal joint was apparently unstable and easily subluxable medially. There was tenderness on the lateral side of the joint but not on the dorsal or plantar side. Radiographic examinations showed no structural abnormality but a varus stress radiograph revealed a remarkable widening of the joint space laterally compared with the contralateral foot (fig 1).

Buddy taping of the first and second toes was ineffective and the patient needed a stable joint to continue training. We thought repair of the ligament would be impossible or unreliable due to the chronicity of the injury, so planned to make a lateral collateral ligament. A lateral longitudinal incision over the hallux interphalangeal joint was made and the interphalangeal joint was reached dorsal to the volar neurovascular structures. The middle portion of the ligaments had healed with scar tissue but the quality of the tissue was inadequate for direct repair or plication. Drill holes were made parallel to the joint at the normal insertion sites of the collateral ligament. A palmaris longus tendon was taken from the forearm using two small transverse incisions. The tendon graft was passed through the holes from the lateral wound and the two ends were tied on the medial side separate wound after checking for full range of motion of the joint (figs 2 and 3). After 4 weeks of immobilisation the interphalangeal joint was mobilised for active range of motion, and 3 months after the operation the patient was allowed to participate in training. One year after the operation the patient remained asymptomatic and the interphalangeal joint was stable and congruent without any varus instability, having 45° of flexion and full extension compared with 60° of flexion of the unoperated toe (figs 4 and 5).

DISCUSSION

The hallux interphalangeal joint is stable anatomically. The collateral ligaments which attach to the lateral side of the

Figure 1 Stress radiograph showing marked widening of the lateral side of the left hallux interphalangeal joint. Informed consent was obtained for publication of this figure.

Figure 2 A palmaris longus free tendon graft was passed through the holes made in the normal insertion sites of the collateral ligament of the interphalangeal joint. Informed consent was obtained for publication of this figure.

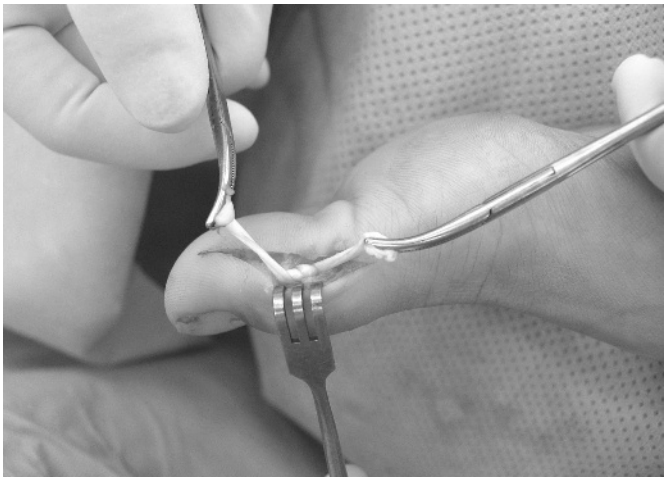

Figure 3 The two limbs of the tendon were tied in the opposite side of the joint. Informed consent was obtained for publication of this figure.

proximal phalangeal head and the dorsal tubercle at the base of the distal phalanx act as a strong static stabiliser in the transverse plane.[4] The joint capsule and its thickened fibrocartilaginous plantar plate and the flexor and extensor hallucis longus tendon provide the sagittal plane stability. The bicondylar shape of the joint and the short lever arm of the distal phalanx also contribute to the stability.[5] When hyperextension force is directed on the joint, a traumatic dorsal dislocation can occur. Generally, closed manipulation is achieved easily and results in little morbidity, except for rare cases of irreducible dorsal dislocation caused by incarceration of the plantar plate, interphalangeal sesamoid or fracture fragments.[5 6] When force is directed on the joint in the transverse plane—like stubbing the toe against the step or the stones—intra-articular fractures seem to occur more commonly than ligament ruptures because of the strong collateral ligaments and the stable joint structure.

Figure 4 One year after the operation the hallux interphalangeal joint remained congruent. Informed consent was obtained for publication of this figure.

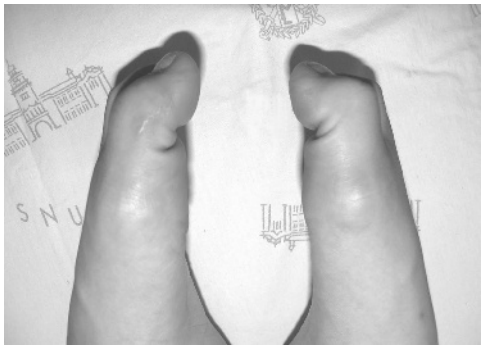

Figure 5 Flexion of the left hallux interphalangeal joint was 45° which was slightly less than the normal side. Informed consent was obtained for publication of this figure.

We have reconstructed the collateral ligament of the hallux interphalangeal joint with varus instability in a taekwondo athlete and obtained a stable and mobile joint which enabled the patient to continue training. Arthrodesis of the joint could be an option and would have provided more definite stability for daily activities, but we assumed that a martial art athlete who frequently runs, jumps and kicks requires a mobile interphalangeal joint with adequate flexion movement during the push-off phase. The palmaris longus tendon was chosen for a donor tendon. We thought taking this tendon might have the least morbidity to the patient who uses the lower extremity more often than the wrist during training because almost 80% of the competitive techniques used in taekwondo are kicks.[7]

In studies comparing the rate of injuries in common martial arts, taekwondo had the highest risk of injury and the lower extremities tended to get injured more often in taekwondo training than in the injuries of other martial arts.[8 9] This is because taekwondo relies on fast powerful kicks using the dorsum or lateral side of the foot.[7 10] Olympic-style full contact sparring in taekwondo now requires protective equipment, including not only head gear, chest protectors and shin pads but also padding for the hands and feet. However, the feet protectors commonly used do not cover the interphalangeal joint, leaving the joint still vulnerable to high speed impacts. Taekwondo athletes should be warned about this type of

What is already known on this topic

- The hallux interphalangeal joint is inherently stable in the transverse plane compared with the metatarsophalangeal joint.
- Taekwondo has a high risk of injuries of the lower extremity because most competitive techniques are kinds of kicks.

What this study adds

- We report a rare case of varus instability of the hallux interphalangeal joint in a taekwondo athlete.
- Taekwondo athletes should be warned about this type of forefoot injury and lateral collateral ligament reconstruction can be a reasonable treatment for chronic varus instability of the hallux interphalangeal joint.

forefoot injury and mat conditions should be carefully checked during training.

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